PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

21 JUL 2004

Applicant's or agent's file reference DP020708	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/JP02/08389	International filing date *(day/month/year)* 20.08.02	Priority date *(day/month/year)* 29.01.02
International Patent Classification (IPC) or national classification and IPC Int.Cl⁷ A61B 5/00 , A61B5/20 , A61B5/22		
Applicant NIHON UNIVERSITY		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☑ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 10 sheets.

3. This report contains indications relating to the following items:

   - I ☑ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☑ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
02.12.02	24.03.03
Name and mailing address of the IPEA/JP **Japan Patent Office** 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer YOSHIHITO ITO Telephone No. +81-3-3581-1101 Ext. 3291
	2W 9604

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.
PCT/JP02/08389

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☑ the description:
pages 1-2,5-19 , as originally filed
pages _____ , filed with the demand
pages 3,3/1,4,4/1 , filed with the letter of 05.03.03

☑ the claims:
Nos. 3,4,6,7 , as originally filed
Nos. _____ , as amended (together with any statement) under Article 19
Nos. _____ , filed with the demand
Nos. 1,2,5 , filed with the letter of 05.03.03

☑ the drawings:
sheets/fig Fig.1-7 , as originally filed
sheets/fig _____ , filed with the demand
sheets/fig _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.
PCT/JP02/08389

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-7	YES
	Claims		NO
Inventive step (IS)	Claims	1-7	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-7	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The following document has been considered for the purpose of this report:

D1 = [JP 4-19862 B2]
D2 = [JP 3151153 B2]
D3 = [JP 3-54575 B2]

1. Claims 1-7

The subject matter of claims 1-7,that is "a resilient arm member having one end and the other end, said one end supporting said at least one probe thereon and said the other end being firmly fixed to said probe base", is neither disclosed in any of the documents cited in the ISR nor obvious to a person skilled in the art.

body.

According to one aspect of the invention, there is provided an elasticity measuring device for being inserted into a canal part of a human body and for measuring elasticity of the inner side of the canal part of the human body, the device comprising:

a probe base for being inserted into the canal part of the human body;

a plurality of probes symmetrically arranged around the probe base, which are located near the inner side of the canal part of the biological tissue when the device is inserted into the canal part and are driven to press onto and return from the biological tissue;

a plurality of resilient arm members each having one end and the other end, the one end supporting thereon corresponding one of the plurality of probes and the other end being firmly fixed to the probe base;

a stress detection sensor provided on each of said probes, for detecting the hysteresis of the stress applied to the biological tissue based on the repulsion from the biological tissue when said probes are driven to press onto and return from the biological tissue; and

a deviation detection sensor for detecting the hysteresis of changes in distance of said stress detection sensor with respect to the probe base,

wherein the elasticity of the biological tissue is measured based on the hardness and deviation characteristics when the probes are driven to press onto and return from the biological tissue.

According to another aspect of the invention, there is also provided an elasticity measuring device for being inserted into a canal part of a human body and for measuring elasticity of the inner side of the canal part of the biological tissue, the device comprising:

a probe base for being inserted into the canal part of the human body;

a plurality of probes symmetrically arranged around the probe base, which are located near the inner side of the canal part of the biological tissue when the device is inserted into the canal part and are driven to press onto and return from the biological tissue;

a plurality of resilient arm members each having one end and the other end, the one end supporting thereon corresponding one of the plurality of probes and the other end being firmly fixed to the probe base;

a hardness sensor provided on each of the probes, for outputting a signal indicative of hardness of the biological tissue;

a hardness detection means for detecting the hardness of the biological tissue based on the signal from the hardness sensor; and

a deviation detection sensor for detecting the deviation magnitude of the hardness sensor with respect to the probe base,

wherein the elasticity of the biological tissue is measured based on the hardness and deviation characteristics when the probes are driven to press onto and return from the biological tissue.

CLAIMS

1.(Amended) An elasticity measuring device for being inserted into a canal part of a human body and for measuring elasticity of the inner side of the canal part of the human body, said device comprising:

a probe base for being inserted into the canal part of the human body;

at least one probe arranged around said probe base, which is located near the inner side of the canal part of the human body when the device is inserted into the canal part and is driven to press onto and return from the biological tissue;

a resilient arm member having one end and the other end, said one end supporting said at least one probe thereon and said the other end being firmly fixed to said probe base;

a stress detection sensor provided on said probe, for detecting hysteresis of the stress applied to the biological tissue based on the repulsion from the biological tissue when said probe is driven to press onto and return from the biological tissue; and

a deviation detection sensor for detecting the hysteresis of changes in distance of said stress detection sensor with respect to said probe base,

wherein the elasticity of the biological tissue is

measured based on the stress and deviation magnitude characteristics when the probe is driven to press onto and return from the biological tissue.

2.(Amended) An elasticity measuring device for biological tissue according to claim 1, in which said resilient arm member comprises a plurality of spring members, a plurality of said probes being symmetrically arranged around said probe base through corresponding spring members.

3. An elasticity measuring device for biological tissue according to claim 2, in which said deviation detection sensor comprises a pair of light emitting element and light receiving element, said light emitting element being secured on a surface of said probe base and said light receiving element being secured on said spring member so as to oppose to each other.

4. An elasticity measuring device for biological tissue according to claim 1, in which said stress detection sensor comprises a distortion guage.

5.(Amended) An elasticity measuring device for being inserted into a canal part of a human body and for measuring elasticity of the inner side of the canal part of the human body, said device comprising:

a probe base for being inserted into the canal part of the human body;

at least one probe arranged around said probe base,

which is located near the inner side of the canal part of

the biological tissue when the device is inserted into the canal part and is driven to press onto and return from the biological tissue;

a resilient arm member having one end and the other end, said one end supporting said at least one probe thereon and said the other end being firmly fixed to said probe base;

a hardness sensor provided on said probe, for outputting a signal indicative of hardness of the biological tissue;

a hardness detection means for detecting the hardness of the biological tissue based on the signal from said hardness sensor; and

a deviation detection sensor for detecting the deviation magnitude of said hardness sensor with respect to said probe base,

wherein the elasticity of the biological tissue is measured based on the hardness and deviation characteristics when the probe is driven to press onto and return from the biological tissue.

6. An elasticity measuring device for biological tissue according to claim 5, wherein said hardness sensor comprises:

a vibration element; and

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PEA/JP 05.03.03

a vibration detector, and wherein said hardness detection means comprises:

an input terminal connected to said vibration detector;